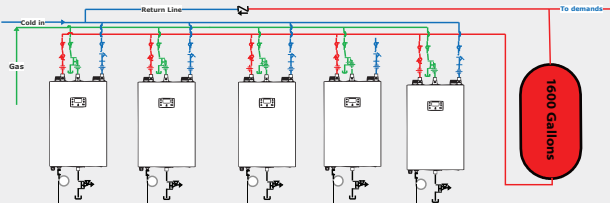
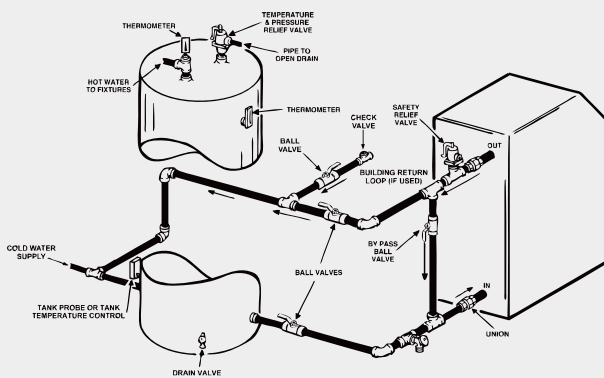


Intellihot helps commercial operation cut costs and increase reliability

Federal Correctional Institute – 5 X 200 MBTU Intellihots + 1600 Gallon Storage



Background

The Federal Correctional Institution (FCI) in Illinois, houses approximately 1500 people. There are several housing units, each holding 400 people. Each housing system is identical in construction and uses the same model and set-up of water heating system. In addition, the water usage is set on a scheduled time during the day.

Current Water Heating System Set Up

In each housing, the heating system consists of two commercial 1,000,000 BTU/Hr natural gas fired boilers with rated thermal efficiency of 80%. Each gas boiler circulates to a separate 800 Gallon storage tank. A 91 GPM pump and an aquastat controls the circulation of the water from the storage tank to the gas boiler. Both the units are operated simultaneously for a total installed capacity of 2,000,000 BTU with 1600 gallons of storage. The aquastat is set at a temperature of 140F. A tempering valve and recirculating pump keeps the water up to the shower heads and faucets hot. This loop is set at approximately 108F.

Building Water Demands

There are 24 shower stalls with 2.0 GPM shower heads that will be used for 15 minutes followed by a 1-2 minutes pause and then used again for 15 minutes. This pattern will be repeated for 8 hours. In addition there are 200 faucets rated at 1.5GPM which can be turned on at any time.

Intellihot Set Up

Five i200P units with a combined capacity of 1,000,000 BTU/hr were cascaded in parallel feeding into both the 800 gallon tanks was set up to replace both 1,000,000 BTU gas boilers. 2" headers pipes were used for the water inlet and outlets. One significant difference was that the incoming water now flowed via each of the five i200P units. There was no change on the existing tempering valve or recirculation pump set-up. The intellihot units were connected using a simple telephone cable (RJ11) and when any unit was programmed for the recirculation time and temperature, it automatically carried over the set parameters to other units. A 2" return line via check valve brought water back from each of the 800 gallon storage tanks to the inlet side of the Intellihot units. No external pump or aquastats were needed.

The programmed temperature is 125F and set to come on from 6AM to 9PM in one hour intervals. During this time the Intellihot units powered on and brought the 1600 gallon tank up to 125F. Also, at any given time depending on the amount of flow demanded from both the 800 gallon tanks, one or multiple i200P units fire to replenish both the 800 gallon tanks.

Gas usage analysis (43.2% reduction measured)

Two diaphragm type gas meter with a maximum capacity of 2000CFH and a $\pm 2\%$ measurement accuracy were set up – one in the building using the intellihot units., the other in an adjacent building using the existing boiler set up. It should be noted that both building are identical in construction, have identical occupancy, identical schedules, identical ground water temperature, and same gas source. Gas usage was monitored in both buildings for a period of 31 days. A summary of the results is shown in the table below.

	Units	Housing unit with Intellihot unit	Housing unit with existing tank water heater
Average Gas consumption (measured over 31 days)	Cu.ft/day	6,550	11,530
Average commercial natural gas rate in Illinois in 2011	\$/Cu.ft	\$0.0088	\$0.0088
Water heating cost	\$/day \$/year	\$57 \$20,943	\$101 \$36,866
Drop in gas consumption using Intellihot units		43.2%	
Annual \$ savings using Intellihot units		\$15,923	

A gas saving of 43.2% was measured. This translated to approximately \$16,000 in gas utility savings per year and a payback of less than 3 years.

The following advantages were noted in this installation:

- Simplified piping - Water and gas connections on top enabled easy accessible piping.
- No external pump was needed, Intellihot uses its built-in pump.
- No external aquastat or wiring was needed.
- The Low pressure drop, full flow design, enabled users to see no difference in water flow
- Common PVC venting made installation quick and easy, requiring only 2 penetrations.
- Masterless cascading ensured high up-time and reliability.
- The units were cascadable without any additional parts.



Commercial Application

Model	i200P
Type	Indoor, Wall hung
Fuel	Preset for NG /LP convertible
Minimum /Maximum Input (BTU/Hr)	30,000 / 199,950
Thermal Efficiency	94%
Energy factor	0.93
Dimensions H X W X D (inches)	25.9 X 17.5 X 14.2 (3.7 cu. ft)
Weight (lbs)	98
Venting Type	Direct Vent (2 pipe - intake & exhaust), Power vent (1 pipe - exhaust only)
Max Vent Length (Sch. 40 PVC)	3" - 100 ft

Features

Recirculation	Return line, Tank Loading
Cascading	Masterless, 10 units
Heat exchanger	Expandable, Stainless 316L

Performance

Hot Water Capacity (35F Rise)	10.8
Hot Water Capacity (45F Rise)	8.4
Hot Water Capacity (77F Rise)	5.0
Commercial Mode Temp. Settings	100 - 185°F

Warranty (with recirculation)

HEAT EXCHANGER COIL
6 YEARS, PARTS - 5 YEARS, LABOR - 1 YEAR



intellihot™

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